

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.-28. (Cancelled)

29. (Currently Amended) A base station apparatus comprising:

a deciding section for deciding an allocation for a plurality of mobile stations within a communication area, by judging:

1) whether one of the plurality of mobile stations is a space-division-multiplex (SDM) compatible mobile station by use of a predetermined SDM evaluation criterion; and

2) whether another of the plurality of mobile stations is a space-division-multiple-access (SDMA) compatible mobile station to which a SDMA transmission can be applied along with the SDM compatible mobile station by use of a predetermined SDMA evaluation criterion;

wherein the SDM transmission evaluation criterion and the SDMA evaluation criterion are to be calculated depending upon a channel estimation value and received quality received from the SDM compatible mobile station and the SDMA mobile station within the communication area;

a partial-space orthogonalizing section for performing a weighting process, for enhancing orthogonality over a propagation path for the SDM transmission, on a first transmission data sequence to be sent by the SDM transmission to the SDM compatible mobile station;

a beam forming section for forming a plurality of transmission beams for an output of the partial-space ~~orthogonalizing~~ orthogonalizing section in order to send the first transmission data sequence by the SDM transmission to the SDM compatible mobile station and a single

transmission beam for a second transmission data sequence to be sent by the SDMA transmission to the SDMA compatible mobile station; and

a plurality of antennas for transmitting the first transmission data sequence using the plurality of transmission beams and the second transmission data sequence using the single transmission beam.

30. (Currently Amended) A base station apparatus according to claim 29, wherein forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam from the transmission data sequence to the allocated SDMA compatible mobile station and an output of the partial-space ~~orthogenizing~~ meansorthogonalizing section, in a manner being orthogonal to a channel estimation matrix on another mobile station to access simultaneously.

31. (Previously Presented) A base station apparatus according to claim 29, wherein, in a case that the SDM compatible mobile station and a SDM incompatible mobile station are allocated for the SDMA communication at a same time, the beam forming section makes, for the SDM incompatible mobile station, a maximum ratio synthetic beam as a transmission beam to the SDM incompatible mobile station and, for the SDM compatible mobile station, another transmission beam as a beam for reducing an interference with another of the SDM incompatible mobile station and the SDM compatible mobile station to access simultaneously.

32. (Previously Presented) A base station apparatus according to claim 30, wherein, in a case that the SDM compatible mobile station and a SDM incompatible mobile station are allocated for the SDMA communication at a same time, the beam forming section makes, for the SDM incompatible mobile station, a maximum ratio synthetic beam as a transmission beam to the SDM incompatible mobile station and, for the SDM compatible mobile station, another transmission beam as a beam for reducing an interference with another of the SDM incompatible mobile station and the SDM compatible mobile station to access simultaneously.

33. (Previously Presented) A base station apparatus according to claim 29, wherein, forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam orthogonal to a channel estimation matrix on another of a SDM incompatible mobile station and the SDM compatible mobile station to access simultaneously.

34. (Currently Amended) A base station apparatus according to claim 29, further comprising space-time coding means for making a space-time coding process on the transmission data sequence to the SDM compatible mobile station,

the transmission data sequence space-time-coded being outputted to the partial-space
orthogonalizing sectionorthogonalizing means.

35. (Currently Amended) A base station apparatus according to claim 30, further comprising space-time coding means for making a space-time coding process on the transmission data sequence to the SDM compatible mobile station,

the transmission data sequence space-time-coded being outputted to the partial-space
orthogonalizing sectionorthogonalizing means.

36.-41. (Cancelled)

42. (Previously Presented) A base station apparatus according to claim 29, wherein, in a case that the SDMA mobile stations include a SDM compatible mobile station and a SDM incompatible mobile station, another transmission beam to the SDM incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the SDM incompatible mobile station, and the transmission beam to the SDM compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another SDMA mobile stations to access simultaneously.

43. (Previously Presented) A base station apparatus according to claim 30, wherein, in a case that the SDMA mobile stations include a SDM compatible mobile station and a SDM incompatible mobile station, another transmission beam to the SDM incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the SDM incompatible mobile station, and the transmission beam to the SDM compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another SDMA mobile stations to access simultaneously.